PANEL 4B -- COMMERCIAL DECISION SUPPORT CAPABILITIES AND SERVICES

Moderator: Mr. Todd Glickman, Massachusetts Institute of Technology

Rapporteurs: Mr. Bradley Rippey, United States Department of Agriculture
Mr. Donald Carver, OFCM (FAA)

Panelists: Dr. Greg Forbes, *The Weather Channel*
Mr. Lester Yoshida, Surface Systems, Inc.
Dr. Peter Gauer, Montana State University
Mr. Hank Pomeranz, GeoWeather Solutions
Mr. Robert Wright, Planning Systems, Inc.

Objective: Provide the basis for developing or refining weather information for future operational decision support capabilities and services.

Synopsis

The Weather Channel

Dr. Greg Forbes stated *The Weather Channel* utilizes focus groups to determine the likely effectiveness and value of potential new services. Focus groups and viewer feedback are used as ways to assess the effectiveness of existing products on their domestic cable service. Nielsen ratings can be obtained on a minute-by-minute basis to assess "viewership" of various information segments. *Weather.Com* keeps track of the number of page hits to track viewer interest in new as well as existing weather products.

Dr. Forbes explained how the public uses TWC information services to make day-to-day decisions on activities that are weather sensitive, such as commuting, planning outdoor events, and completing longer-term travel. When airports or major highway segments are affected by weather, TWC informs the public of known impacts on these modes of travel. The broadcast of major weather events is also of value to the insurance industry and provides advance notice of where flooding may occur and/or where evacuations will be required.

Surface Systems, Incorporated

Mr. Lester Yoshida, Surface Systems, Incorporated (SSI), stated there is more to decision support than merely making a decision. The Department of Defense has well-documented steps in the processes of Command, Control, and Communications and the development of Command Centers whose function is not only to make a decision but to ensure that the decision can be acted upon. A simplified model used in the commercial world is Detect, Verify, and Respond. In Road Weather Information System (RWIS) technology, there has been a missing link -- how to verify road conditions. Presently, manual inspection by snowplow drivers is the predominant feedback mechanism.

SSI decision support systems focus on the needs of two sets of customers: public maintenance organizations and drivers of vehicles on roadways. Assuming that the information collected is accurate, the decision process requires timely dissemination of forecasted events as the road maintenance techniques change from de-icing to anti-icing methodologies. Pavement forecasts up to 24 hours in advance let the maintenance operations know the predicted weather and pavement conditions for specific locations and times allowing for proactive use of anti-icing techniques. Some of the tools available for decision support are *ScanCast* pavement forecasts as well as *WeatherBridge.com*. SSI developed both tools specifically for public agencies.

For the general public and professional drivers, SSI has developed free websites to allow drivers to see real-time weather and road data. These sites, *roadweather.com* and *truckerweather.com* allow drivers to see where hazardous driving conditions, such as potential freezing, high winds, and low visibility are occurring. By providing this information for free to the all drivers, SSI hopes to work in partnership with the public agencies to promote safer driving and safer roadways.

Montana State University

Dr. Peter Gauer, Montana State University, presented research results on ice formation on roads. Icy road surfaces are an obvious safety issue on highways in cold climates. An accurate forecast of the pavement temperature along continuous roadway sections would have a positive influence on maintenance decision-making. The timing of the application of freezing point depressants is particularly crucial for implementing an effective anti-/de-icing program. Cost savings and increased efficiency could be realized by state DOT's in that resources can be applied to crucial areas in a more effective and timely way. Based on real-time or forecast data, the public could be alerted to potential problem areas.

Dr. Gauer presented a model chain for the thermal mapping along highway sections. The core of the chain is the WinTherm module. WinTherm is a first principle model, i.e. the surface temperature is calculated based on surface energy balance. It accounts for the three-dimensional topography of the surrounding terrain by calculating the contribution of the radiation emitted and reflected from neighboring cells. Currently, WinTherm is running on a 30-meter resolution using standard USGS DEM's. To drive the model, meteorological input data are required for each cell. These input data are provided using ARPS developed by the Center for Analysis and Prediction of Storms. ARPS is running on a 1-kilometer grid resolution. The combination of both models allows a spatially precise forecast of the pavement temperature.

A successful implementation of the model chain can be a useful tactical decision support tool for winter highway management. To improve the performance of the chain, further research should address the reliability of the forecasted meteorological data, grid nesting and meshing, the influence of changing surface properties, melting, icing, sublimation, condensation, etc.

GeoWeather Solutions

Mr. Hank Pomeranz, Litton/PRC, described GeoWeather Solutions as a geographical information system (GIS) based system with uses in determining the economic impact of weather in emergency management, utilities, transportation, and telecommunications. Using the NOAAPORT data stream, the system can detect weather parameters that have exceeded an important, customer specified threshold. These thresholds are important because the user must make some action or decision. The system can cover the entire country and can be triggered by forecast as well as observed conditions. Effectively, it screens out the information that is unimportant to the user.

Planning Systems, Incorporated

Mr. Robert Wright, Planning Systems, Incorporated, stated that objective wind forecast fields from atmospheric models have successfully been used to save time and/or fuel for air and sea transportation systems by determining optimum route and schedule. This weather support concept can be applied to land transportation systems, primarily long-haul commercial trucking operations. Potentially, significant fuel savings can be realized by using forecast surface wind fields to determine optimum departure times for available long-haul truck routes. Forecast surface wind fields, available from National Centers for Environmental Prediction models via NOAAPORT National Weather Service Telecommunication Gateway (e.g., Eta, Nested Grid Model, and Rapid Update Cycle), can be applied to reduce trucking industry fuel costs through the intelligent use of this type of weather information.

A strong, rapidly changing surface wind event in the Great Plains was used to demonstrate potential fuel consumption as a function of departure time for the Interstate-80 (I-80) route from Cheyenne, Wyoming, to Omaha, Nebraska. A strong surface low-pressure center developed on April 5, 2000 in Southeast Colorado and moved rapidly northeast to over the Great Lakes in 24 hours. The 5th-Generation NCAR/Pennsylvania State Mesoscale Model (MM5), with a 36-kilometer inner-domain nested grid mesh, produced analysis, and forecast fields covering the surface low-pressure center and I-80. MM5 produced forecast surface winds (lowest grid level 30 meters above ground level) on the order of 40 miles-per-hour (mph)

Analyzed/forecast surface winds at grid points on an east-west MM5 grid line, over I-80, were used to simulate fuel consumption for a Class 8 Tractor-Trailer--(80,000 pounds gross weight, 0.6 drag coefficient, and 0.048 gallons/HP-hour for a turbo-charged diesel engine) with an average 67 mph highway speed, and total drive time of 10 hours with 3 intervening stop/rest periods. The simulation assumed, optimistically, that crosswind does not affect either drag coefficient or rolling friction. The resulting head/tail winds affecting I-80, and simulated total fuel consumption, varied significantly as the forecast low moved northeast. Simulated total fuel consumed varied from 175 gallons to 75 gallons depending on departure time over a 16-hour period. Overall, fuel savings potential depends on season and region and a statistically significant study, tailored to trucking

operations, is required to objectively demonstrate savings potential to the trucking industry and interested federal agencies. Total fuel burned versus change in departure time is the cost/benefit metric. The support concept is best suited for centrally controlled operations with fixed routes and flexible schedules (e.g., Less-Than-Load operations). The same tailored technology can be made available to independent truckers and small trucking companies through an interactive Internet web site. Tailored surface wind forecast support can save not only costs, especially in light of volatile fuel prices, but also reduces the impact of the trucking industry on air pollution.

Follow-up Discussion

Several points were discussed during the question and answer period. There are a large number of capabilities and services available to surface transportation users but it is unclear whether users are aware of many of them. There is also a need to increase the dialog between the users regarding their specific decision needs and providers who can tailor decision support products. Also, the panel noted the need to bring more available data from the road weather information system mesonets into a master database. The data will enable models to be run more frequently. The panelists agreed there is a need for users and providers alike to open the dialog. It was noted that Wisconsin State DOT was the only state with a meteorologist on the staff. Lastly, there is a need for more public education on these matters. *The Weather Channel* is considering a special broadcast segment.

Links to Presentations:

Mr. Lester Yoshida, SSI
www.ofcm.gov/WistII/Presentations/Day2/6_Panel4B/Yoshida.ppt

Dr. Peter Gauer, Montana State University
www.ofcm.gov/WistII/Presentations/Day2/6_Panel4B/Gauer.ppt

Mr. Hank Pomeranz, GeoWeather Solutions
www.ofcm.gov/WistII/Presentations/Day2/6_Panel4B/5_Pomeranz_all3parts.ppt

Mr. Robert Wright, Planning Systems, Inc.
www.ofcm.gov/WistII/Presentations/Day2/6_Panel4B/Wright.ppt